Information rigidities and the news-adjusted output gap

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A R T I C L E I N F O

A B S T R A C T

A vector-autoregressive model of actual output and expected output obtained from surveys is used to test for information rigidities and to provide a characterisation of output dynamics that accommodates these information structures. News on actual and expected outputs is decomposed to identify innovations understood to have short-lived effects and these are used with the model to derive a 'news-adjusted output gap' measure. The approach is applied to US data over 1970q1–2014q2 and the new gap measure is shown to provide a good leading indicator of inflation.

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1. Introduction

Expectation formation and agents' use of information are recognised as being central to the understanding of output and price dynamics and of macroeconomic policy effects but the nature of their role remains controversial. For example, the influential papers by Mankiw and Reis (2002), Sims (2003) and Woodford (2003) explore the consequences of various forms of information rigidity in rational expectations' models. Here, agents are assumed to be rational but are either slow to take account of macroeconomic information even when it is publicly available ("sticky information models") or are only able to observe the fundamentals on which decisions are based with error ("noisy information"). In these circumstances, the divergence between belief and reality can generate short-run fluctuations in prices and output that are quite separate from their long-run time-paths. This can have important implications for the conduct of policy since policy will be most effective if it works with, and takes advantage of, agents' use of information.[1]

This paper describes how survey data on expectations can be used to obtain direct measures of the news on current and future output levels as perceived by agents in real time and taking into account the potential for information rigidities. A novel decomposition method is then described to investigate the agents' use of this new information, separating out that part which is expected to have a permanent effect on output from that part expected to have more short-lived effects. The methods are illustrated using data from the U.S. Survey of Professional Forecasters over the last 45 years and their usefulness

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  [1] See for example, Ball et al. (2005) and the recent work by Blanchard et al. (2013), Kurlish and Pagan (2013) and Lorenzoni (2010), among others.

is illustrated through the construction of a 'news-adjusted' output gap measure that is purged of the effects of output movements that are known to be short-lived. The measure is found to be a good leading indicator of inflation in the US, showing the potential value of taking into account agents' use of information in the conduct of policy.

The survey responses of professional forecasters have been used recently to examine the nature and extent of information rigidities by Carroll (2003), Andrade and LeBihan (2013), Coibion and Gorodnichenko (2011, 2012), and Dovern et al. (2016), inter alia. In those papers, the analysis of forecasters' responses at the individual level and at an aggregated level provides evidence in favour of both sticky information models and relatively simple noisy information models.[2] The information contained in surveys of professional forecasters is exploited again here in this paper to test for the presence of information rigidities through an analysis of the relationships between forecast errors and revisions in forecasts, following the approach of Coibion and Gorodnichenko (2012) but extended in two ways: first, the tests are conducted in the context of a linear VAR analysis of data on actual output and expected output at various forecast horizons so they provide a more information-rich context for the tests than in univariate analyses; and then the tests are carried out in a non-linear extension of the multivariate model accommodating the possibility that agents' use of information changes according to the state of the business cycle. Moreover, having tested and imposed an appropriate information structure on the multivariate VAR, we can obtain direct measures of the news content contained in the actual and survey output data as perceived by agents in real time and taking into account the information rigidities found in the data. It is these measures of news that are then further exploited to identify forecasters' beliefs on the long-term and short-term consequences of output innovations and which provide the basis of the decomposition of output innovations into separate meaningful elements distinguished according to agents' views on the permanence of their effects.[3]

Our decomposition of the innovations to the VAR is in the spirit of Blanchard and Quah (1989) in that it assumes output is characterised as a unit root process and identifies a single stochastic trend which drives the permanent changes in actual and expected outputs and the associated Beveridge–Nelson (1981) [BN] trend.[4] Blanchard and Quah noted that the trend derived from the permanent shocks alone will not adequately represent the trend in a standard business cycle decomposition though as this should accommodate fluctuations in output caused by short-term, transitory shocks as well as permanent ones. Practically there are also a variety of 'policy lags' between the time a macro-problem arises and the time a policy response takes effect.[5] Failure to incorporate the short-lived effects into the trend means the associated gap measure will over-react to changes in output and the size and timing of any implied price pressures, say, will be misjudged. Policy based on the gap will also over-react to output change and generate unnecessary policy-induced volatility. The 'news-adjusted gap' proposed in this paper addresses this problem providing a tool for policy makers that works with, and takes advantage of, agents' use of information. We illustrate the importance of the news-adjustments in this paper by comparing our gap measure with other measures known to perform well in explaining inflationary pressures in the U.S. over the last forty-five years.

The layout of the remainder of the paper is as follows. Section 2 introduces the linear VAR model that can capture the time series properties of actual output and the direct measures of output expectations. It also describes the non-linear extension used to accommodate the possibility that these properties could change over time. The section then describes the restrictions implied by the different forms of information rigidities, motivates the decomposition of the innovations into permanent and known-to-be-transitory shocks, and describes how we can obtain output gap measures based on the BN trend output alone and then adjusted to take into account a news-adjustment. Section 3 describes the application of the methods to quarterly US data over the period 1970q1–2014q1. Linear and non-linear versions of the VAR are estimated based on data on actual and output expectations for up to four quarters ahead and tests on the information structures are carried out. As we shall see, the 'noisy information model' appears to fit the data well and so we consider in detail the gap measures based on the model incorporating these restrictions, comparing their properties to those of other popular gap measures both in statistical terms and in terms of their ability to capture inflationary pressures. Section 4 concludes.

2. Use of information in VAR models of actual and expected outputs

2.1. VAR models and tests of information rigidities

A simple linear VAR model of the joint determination of actual output and direct measures of expected future output assumes that actual output is first-difference stationary, and that expectational errors are stationary. The first of these

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